

ABSTRACT OF THE DISCLOSURE

IN-SITU DEPOSITION AND DOPING PROCESS FOR POLYCRYSTALLINE
SILICON LAYERS AND THE RESULTING DEVICE

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An in-situ deposition and doping method for polycrystalline silicon layers of semiconductor devices. A first intermediate layer of in-situ doped polycrystalline silicon is grown, and a second additional layer of polycrystalline silicon is grown with a lower doping level than that of the first intermediate layer of polycrystalline silicon. In one preferred method, the second doping level is substantially lower than the first doping level. Additionally, a semiconductor memory device of the type having a gate stack is provided. The memory device includes at least one gate layer of polycrystalline silicon, and the gate layer of polycrystalline silicon is formed from a first intermediate layer of polycrystalline silicon with a first doping level, and an overlaying second additional layer of polycrystalline silicon with a second doping level that is lower than the first doping level. In a preferred embodiment, the second doping level is substantially lower than the first doping level.

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